

# 2020 Census: Post-Enumeration Survey

**JASON Winter Study: 2020 Census Quality Process Assessment**  
**Date: January 7, 2021**

**Patrick J. Cantwell**  
**Chief, Decennial Statistical Studies Division**

**Timothy Kennel**  
**Assistant Division Chief, Statistical Methods**

Cleared for Release

DRB Number: CBDRB-FY21-DSSD007-0007

Shape  
your future  
START HERE >

United States<sup>®</sup>  
**Census**  
**2020**

# Outline

1. Introduction to Census Quality
2. 2020 Post-Enumeration Survey Design
3. Schedule and Reports

# Introduction to Census Quality

Shape  
your future  
START HERE >

United States<sup>®</sup>  
**Census**  
**2020**

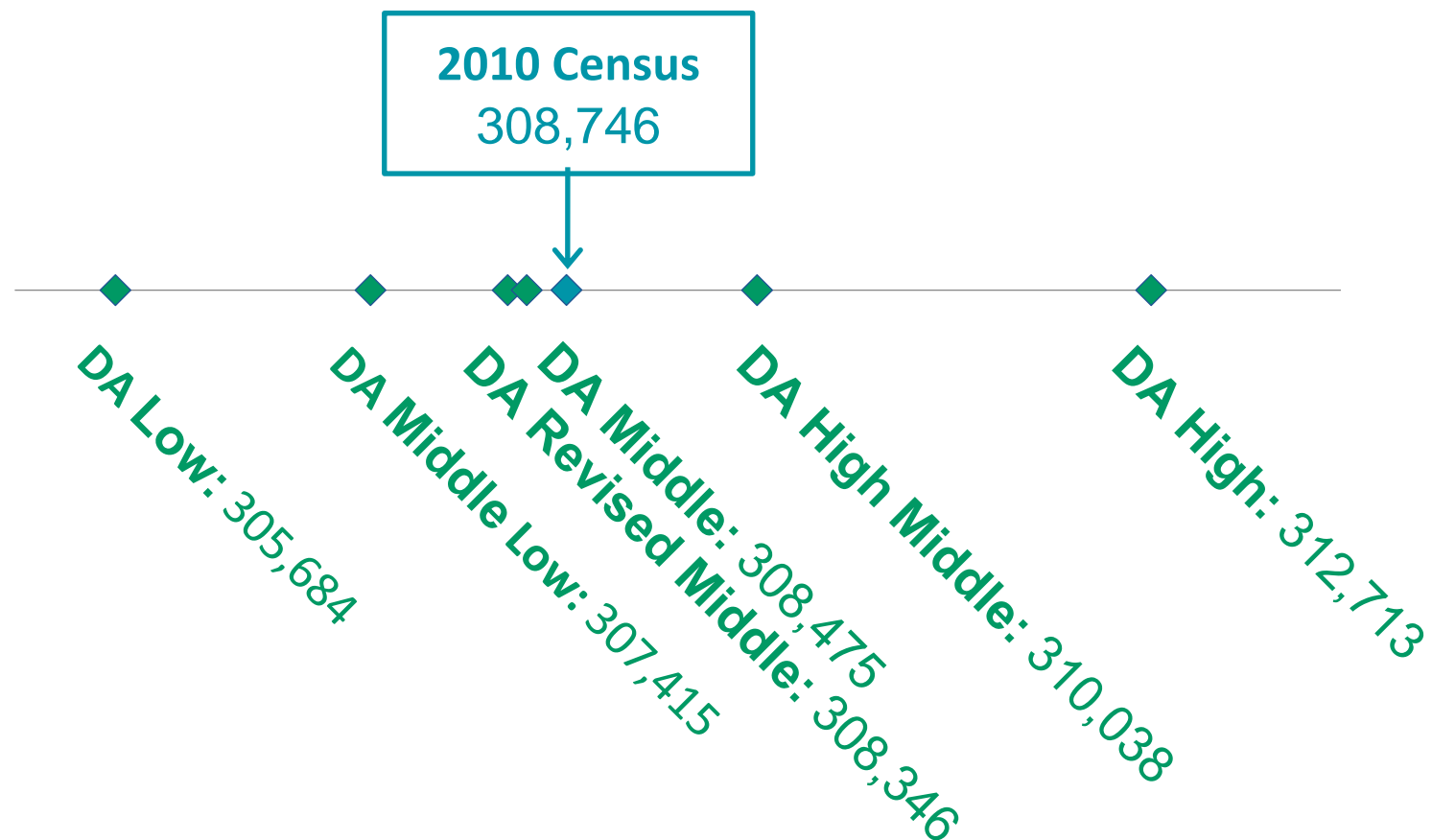
# Measuring Census Quality

- **Census process indicators**
- **Assessments and evaluations of census operations**
- **Demographic Analysis (DA) and other methods**
- **Post-Enumeration Survey (PES)**

# Coverage Measurement in the Past

- **Demographic analysis for decades**
- **Coverage measurement surveys**
- **1980 Post-Enumeration Program**
- **1990 Post-Enumeration Survey**
- **2000 Accuracy and Coverage Evaluation**
- **2010 Census Coverage Measurement survey**

# 2010 Census and Demographic Analysis (in Thousands)



# Net Coverage Error

**Net census coverage error (defined as)**

**= Census count – True population size**

**Negative** coverage error means fewer people are included in the census than are in the true population (undercount)

**Positive** coverage error means more people are included in the census than are in the true population (overcount)

**Note: In the past, that is, up through 2010, documentation of results from the Census Bureau's post-enumeration surveys has generally defined the net undercount using the opposite of the difference above. When providing results from 2020, and in these slides covering past results, we will use the definition above.**

# Net Undercount of US Household Population

Year	Census Count	Net Coverage Error	Percent Coverage Error
2010	300,700,000	36,000.	0.01 %.
2000	273,600,000	1,332,000*	0.49 %*
1990	248,700,000	– 3,994,000*	– 1.61 %*

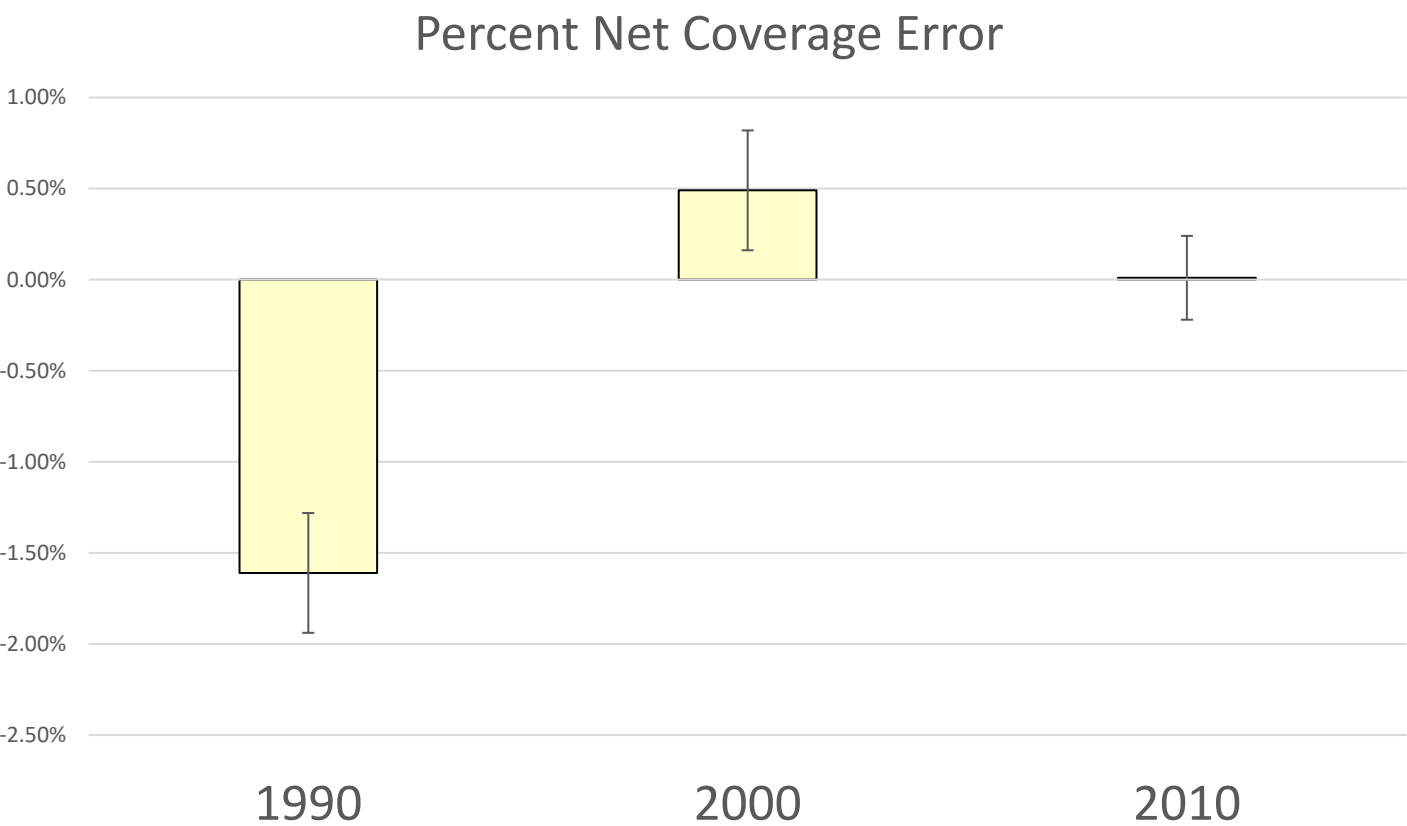
\* Statistically different from zero

Census counts for 1990, 2000, and 2010 exclude Remote Alaska.

Census counts for 2000 and 2010 exclude Group Quarters population.

Census count for 1990 included people in housing units and in noninstitutional and nonmilitary Group Quarters.

# U.S. Total Percent Net Coverage Error from 1990 - 2010



Error bars indicate 90% confidence interval.

# Components of Census Coverage for the 2010 United States Household Population (in Thousands)

Component of Census Coverage	Estimate	Standard Error	Percent	Standard Error
Census Count	300,700	0	100.0	
Correct enumerations	284,700	199	94.7	0.07
Erroneous enumerations	10,040	199	3.3	0.07
Due to duplication	8,521	194	2.8	0.06
For other reasons	1,520	45	0.5	0.01
Whole-Person Census Imputations	5,993	0	2.0	0
Estimate of Population	300,700	429	100.0	
Correct enumerations	284,700	199	94.7	0.1
Omissions	16,000	440	5.3	0.1
Net Coverage Error	36	429	0.01	0.14

# 2020 Post-Enumeration Survey Design

Shape  
your future  
START HERE >

United States<sup>®</sup>  
**Census**  
**2020**

# What is the Post-Enumeration Survey?

## Goal

- **Measure coverage of people and housing units in the decennial census**
- **Measure net coverage error and components of coverage**
- **No intent to adjust the census counts**

## How are the data used?

- **To assess the success of the current census**
- **To provide information to improve the coverage of future censuses**

## How is coverage estimated?

- **Conduct a survey in sample blocks**
- **Match people in the PES independent survey with enumerations in the census to determine who was missed or counted in error**

## History

- **Used in the United States census since 1950**

# 2020 Post-Enumeration Survey Universe

## Household Population and Housing Units

### Excludes

- Group Quarters and Group Quarters Population
- Remote Alaska

# Sample Sizes

## **First sample (Basic Collection Units)**

- **Selected 9,800 Basic Collection Units in 50 states and District of Columbia**
- **Selected 400 Basic Collection Units in Puerto Rico**

## **PES listing**

- **510,000 housing units in 50 states and District of Columbia**
- **18,000 housing units in Puerto Rico**

## **After subsampling (Expected)**

- **180,000 housing units in 50 states and District of Columbia**
- **8,000 housing units in Puerto Rico**

# Two enumerations in sample areas

## Capture (Enumeration sample, E sample)

- A sample of census records (enumerations) in the same block clusters, called E Sample
- Measure correct enumerations in census
- Determine if enumeration is correct or erroneous; duplicate? correct location?

## Recapture (PES sample, population sample, P sample)

- A sample of blocks, independent of the census, in the post-enumeration survey (PES), called P Sample; interview people in units
- Match people in P Sample to Census

# Post-Enumeration Survey (PES)

## How PES Estimates are Created

		Enumerated in PES?	
		YES	NO
Enumerated in Census?	YES	Found in Both	Missing in PES Found in Census
	NO	Missing in Census Found in PES	Missing in Both

# Current version of Dual System Estimator (DSE)

$$\widehat{TOT}_D = \sum_{j \in D} \left[ \pi_{dd,j} \pi_{ce,j} / \pi_{m,j} \right]$$

Where

$\pi_{dd,j}$  is the predicted probability census case  $j$  is data-defined

$\pi_{cd,j}$  is the predicted probability that the census case is a correct enumeration

$\pi_{m,j}$  is the predicted probability that the census case was matched

$j$  is a census enumeration, and

$D$  is the estimation domain (total, tenure status, age/sex groupings, etc.).

# Schedule and Reports

Shape  
your future  
START HERE >

United States<sup>®</sup>  
**Census**  
**2020**

# Revised field milestone schedule

Operation	Original Dates		New Dates	
	Start	Finish	Start	Finish
Independent Listing	1/16/2020	3/13/2020	1/16/2020	3/20/2020
Initial HU Followup	5/6/2020	6/19/2020	7/30/2020	9/21/2020
Person Interview	6/17/2020	9/18/2020	9/23/2020	1/7/2021
Person Followup	2/3/2021	3/26/2021	5/6/2021	7/7/2021
Final HU Followup	5/19/2021	6/18/2021	9/3/2021	10/6/2021

Operations in blue are complete.

# Tentative Person Tabulations from PES

## Three major groups:

- **Demographic or housing unit characteristics**
  - **Age Group**
  - **Age Group by Sex**
  - **Sex**
  - **Race and Hispanic Origin (alone or in-combination and mutually exclusive groups)**
  - **Relationship to Householder**
  - **Tenure (owner or renter)**
- **Geographic areas (states)**
  - **Region**
  - **State**
- **Census operations**
  - **Coverage Improvement Universe**
  - **GSS Partnership County**
  - **In-File Address Canvassing Outcome**
  - **Nonresponse Followup Respondent Type**
  - **Nonresponse Followup Workload**
  - **Response Mode**
  - **Response Rate Decile**
  - **Type of Enumeration Area**

# Schedule to Release Coverage Reports and Tables

## November 2021

- National demographic estimates of net coverage of people
- National demographic estimates of components of coverage for people
- Tables can be downloaded on Census Bureau website

## February 2022

- State coverage estimates for people
- More detailed national coverage estimates for people
- All housing unit coverage estimates
- Coverage estimates for Puerto Rico

# Schedule to Release Methodology Reports

## **November 2021**

- **Source and Accuracy Statement – National Person**

## **February 2022**

- **Estimation Design**
- **Estimation Methods: Characteristic Imputation**
- **Estimation Methods: Missing Data**
- **Estimation Methods: Net Coverage Estimation**
- **Estimation Methods: Component Estimation**
- **Source and Accuracy – All of PES**

# References

Mule, T. (2012), "2010 Census Coverage Measurement Estimation Report: Summary of Estimates of Coverage for Persons in the United States," DSSD 2010 Census Coverage Measurement Memorandum Series #2010-G-01.

The National Academies of Sciences, Engineering, and Medicine. (2015). The Bicentennial Census: New Directions for Methodology in 1990. 30th Anniversary Edition. C.F. Citro and M.L. Cohen, Eds. Committee on National Statistics, Division of Behavioral and Social Sciences and Education. Washington, DC: The National Academies Press.

U.S. Bureau of the Census. 1960 Censuses of Population and Housing: Procedural History. U.S. Government Printing Office, Washington, D.C., 1966.

U.S. Bureau of the Census, U.S. Census of Population and Housing: 1970, Procedural History, PHC (R)-1, Washington, D.C., 1976

U.S. Census Bureau, 1980 Census of Population and Housing, History, Part E, PHC80-R-2E (Washington, DC: U.S. Government Printing Office, August 1989),

U.S. Census Bureau, 1990 Census of Population and Housing, History, Part D, 1990 CPH-R-2D (Washington, DC: U.S. Government Printing Office, March 1996).

U.S. Census Bureau, History: 2000 Census of Population and Housing, PHC-R-V2 (Washington, DC: U.S. Government Printing Office, December 2009).

# Questions